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# HANDLING AND LOADING SOUTHERN NEW POTATOES

A. M. GRIMES

Scientific Assistant



Do Not Ship Potatoes in Hampers  
Breakage and Damage in a Car of Hampers Loaded on Their Sides

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end of file.

FARMERS' BULLETIN 1050  
UNITED STATES DEPARTMENT OF AGRICULTURE

Contribution from the Bureau of Markets  
CHARLES J. BRAND, Chief

Washington, D. C.

May 1, 1919

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**M**UCH of the loss in southern new potatoes in transit and in the markets is caused by field cuts and bruises and by the practice of allowing the potatoes to remain exposed to the sun after digging.

Careful grading will increase the grower's profits and will make a surer and more constant market for his product.

It is important to keep the skin of a potato intact. In handling new potatoes this requires great care.

Cars should be loaded according to a definite plan. Loaders should secure the maximum amount of ventilation throughout the load and avoid methods that allow shifting and breakage in transit.

The double-headed barrel is the most satisfactory package for new potatoes. The heads should be secured by "headliners." The barrels used should conform to the specifications of the U. S. standard barrel. Barrels which are loaded on end carry better than those loaded on their sides.

Cloth-topped barrels do not protect their contents as effectively as those having double heads.

Sacks do not sufficiently protect new potatoes from cuts and bruising. If they are used, those holding from 90 to 120 pounds are the most desirable from the standpoint of careful handling and ventilation of the contents.

Hampers should not be used for the shipment of potatoes.

If crates are used they should be so made as to protect the potatoes from too rapid evaporation and consequent shriveling.

Packages should be marked with the weight or dry measure of their contents.

If stock cars are used, it is generally advisable to protect the potatoes from the sun and weather by lining certain of the open parts with strong building paper.

# HANDLING AND LOADING SOUTHERN NEW POTATOES.<sup>1</sup>

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## COMMERCIAL IMPORTANCE OF THE SOUTHERN NEW POTATO CROP.

THE SOUTHERN NEW POTATO is an important and valuable crop of a perishable nature. A crop of such importance, of so great food value, and yet of so perishable a nature is certainly worthy of sufficient care in harvesting and handling to insure the minimum of waste, a matter which has not received the consideration it deserves from growers and shippers.

The importance and value of the southern potato crop may be estimated from the following figures, which give the carload shipments during the 1917 and 1918 seasons from representative potato-growing States of the South as reported to the U. S. Bureau of Markets.

Carload shipments of southern potatoes.

State.	Season.	1918 season.	1917 season.
Alabama.....	May 1-July 31.....	574	633
Arkansas.....	May 25-July 15.....	<sup>2</sup> 277	334
Delaware.....	June 1-Sept. 30.....	52	52
Florida.....	Apr. 1-July 15.....	4, 834	4, 284
Georgia.....	May 1-July 15.....	267	182
Louisiana.....	May 1-July 31.....	3, 863	1, 042
Maryland (Eastern Shore).....	June 1-Sept. 30.....	706	2, 286
Mississippi.....	May 1-June 30.....	307	160
North Carolina.....	May 15-Aug. 31.....	5, 543	4, 700
Oklahoma.....	May 25-July 15.....	349	625
South Carolina.....	May 1-July 15.....	2, 812	2, 440
Tennessee.....	June 15-Sept. 15.....	18	64
Texas.....	Apr. 25-July 15.....	2, 312	1, 671
Virginia (Eastern Shore).....	June 1-Sept. 30.....	8, 385	14, 123
Virginia (Norfolk).....	May 25-Sept. 30.....	2, 485	5, 003
Total.....		32, 784	37, 599

<sup>1</sup> Mr. Grimes, the author of this bulletin, died on October 18, 1918. The data were collected and prepared by him for publication.

<sup>2</sup> Probably incomplete.

SOME "DONTs" FOR POTATO DIGGERS.<sup>1</sup>

Very large losses of southern potatoes result from injurious practices at the time of digging. Through carelessness, lack of labor, or other cause, many growers allow their potatoes to lie exposed to the hot southern sun for many hours after they are dug, and potato scald develops. Potatoes so affected are often called "cooks," and, although the damage may not be evident at the time of packing, the injured potatoes usually develop soft rot and become mushy and worthless during transit to market or soon after their arrival at

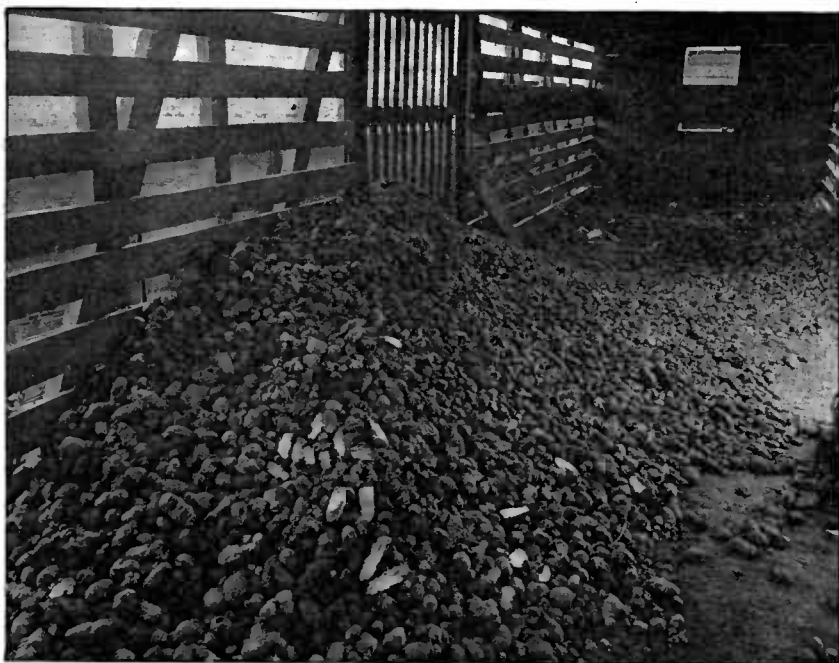


FIG. 1.—Culls. These were sorted out by expensive labor which had to handle every potato in this car from a southern State. This would have been avoided if the grower and shipper had used reasonable care. Chicago, Ill., June, 1918.

destination. Potatoes should not be dug more rapidly than they can be picked and placed in the shade. If possible, it is even better to dig only during the cooler parts of the day, so that the potatoes can be placed in a shady spot without any exposure to severe heat. This is a general practice in some sections of the country.

Whether potatoes are dug with hoes, plows, or machines, care should be taken to reduce the number of field cuts. These offer an entrance for disease, besides damaging the appearance and causing

<sup>1</sup> For a more detailed discussion, see U. S. Department of Agriculture, *Farmers' Bulletin* 753, *Commercial Handling, Grading, and Marketing of Potatoes*. 1916.

waste. The majority of the fungous diseases that cause decay of potatoes and other vegetables can not develop when the skin is free from cuts and bruises. Careful handling is fundamental, therefore, for the prevention of deterioration and waste. In this respect probably no single factor is equal in importance to proper handling, and none is more generally ignored by the average grower, or by the labor which he employs.

### WHY IT PAYS TO GRADE POTATOES.

Ungraded and poorly graded stock also cause heavy losses. In the first place, ungraded potatoes can not compete with graded stock



FIG. 2.—Worthless potatoes should be left on the farm. Waste in a Louisiana dealer's grading shed. This dealer buys field-run potatoes from the farmers and carefully grades them.

on the market, except at a sacrifice in price. The dealer who buys such potatoes either has to sell them at a lower price than well-graded stock will bring or he must grade them himself. In either case he pays the farmer less, and the producer and consumer ultimately pay the freight, labor, and loss on the culls. The farmer would further his own interests by grading his potatoes, securing higher prices for the good grades, and feeding the culls to his live stock. Where an individual farmer does not grow enough potatoes to warrant the investment necessary for a good sizer, it is often possible for him to purchase one in cooperation with his neighbors. Sizing by hand has not proved a success, except where rigid inspection is practiced. Farmers' cooperative associations which grade, load, and

sell the potatoes of their members are operating successfully in many districts.

The term "potato grader" as applied to the mechanical sizer is misleading. The use of a sizing machine does not necessarily insure a good grade of potatoes without the exercise of care in its operation. The potatoes should be fed evenly to the sizing machine and the quantity should not be beyond the capacity of the sizer to separate accurately. When an unduly large quantity of potatoes is dumped on the machine at one time the smaller potatoes often will ride on top of the No. 1 size into the No. 1 container. A large quantity of potatoes on the machine at one time also means careless sorting, without satisfactory removal of diseased and injured potatoes.



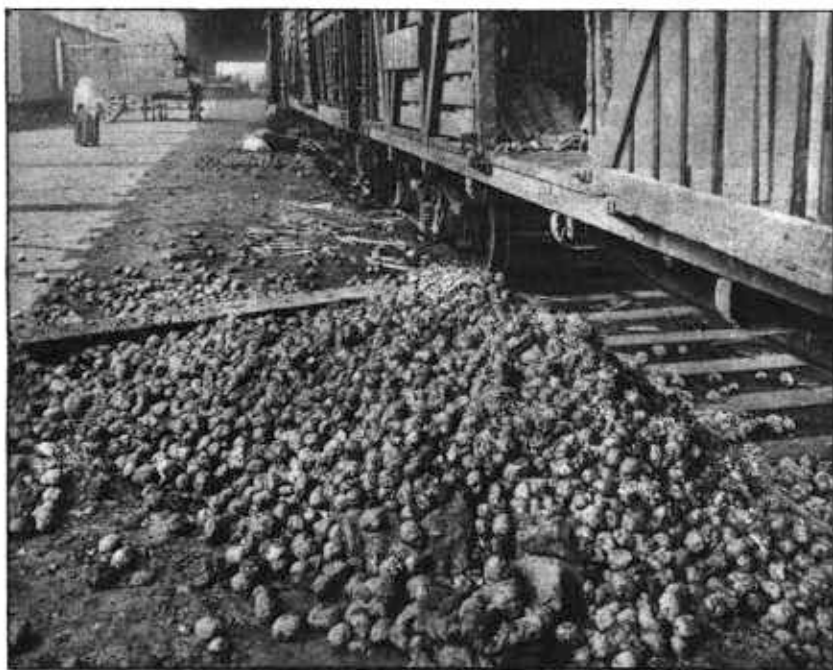
FIG. 3.—Farm grading of potatoes on a Florida farm.

Size is not the only factor in securing a good grade. Grading should eliminate all of those potatoes which are cut and bruised and those which are diseased, because such potatoes will not carry in good condition to market or will detract from the general appearance of the lot. An injured potato has lost its protection against disease and is the largest source of transit loss by decay. Field injury should be reduced to a minimum, and those potatoes which are injured should be eliminated at the sizing machine along with those which are diseased, undersized, or otherwise undesirable.<sup>1</sup> A diseased potato may be a source of infection to others while in transit or in storage, and in any case detracts from the salability of the lot. There should be at least one man at the machine who is employed exclusively to pick out all culls. (See fig. 3.)

<sup>1</sup> Dropping the potatoes from the sizing machine into barrels or crates causes further injury if the fall is not broken.

## **AVOID LOSSES CAUSED BY SHIPPING DISEASED AND BRUISED POTATOES.**

The losses at the large markets were exceptionally heavy during the 1918 season owing to the prevalence of late blight, brown rot, fusarium, and other diseases in the South. One of the worst features of these diseases is that they provide an entrance for bacteria of various sorts. These bacteria cause foul-smelling soft rots during transit, which very quickly spread through the whole car and in many cases make the potatoes unsalable except at a heavy loss.



**FIG 4.**—This waste can be prevented. A part of the waste from a carload of potatoes at Chicago, Ill., June, 1918.

Although diseases of this nature can be more effectively prevented by proper seed treatment, spraying, or other means, a little extra care at the time of packing may be the means of preventing heavy losses on the market.

Bruising is a very common cause of loss in new potatoes. This may be caused either by poor handling methods or by poor containers. Frequently potatoes are thrown on the sizer too roughly; sometimes sacks are dropped from a height, as shown in figures 5 and 6; and often the car loaders drag the sacks over the car floor or even walk over the potatoes. It should always be borne in mind that new potatoes are tender and easily bruised. Bruising has a direct





FIG. 5.—Rough handling causes bruising. Negroes dropping sacks of potatoes onto an elevator. Lafourche, La., June, 1918.

effect on the decay developing in transit and the price received at market.

#### USE THE PROPER METHOD OF LOADING CARS.

The following recommendations for loading cars of new potatoes are based on investigations carried on at the more important shipping points in the South, and on the inspection of several hundred cars of southern potatoes in New York, Philadelphia, Pittsburgh, Chicago, St. Louis, Kansas City, Cincinnati, Cleveland, Detroit, Louis-



FIG. 6.—Another chance for bruising. Removing potatoes from the elevator shown in figure 5, and dropping them on trucks.

ville, and elsewhere. They take into account, in addition, the experiences of successful potato shippers and receivers.

### BARRELS.

#### DOUBLE-HEADED BARRELS.

The double-headed ventilated barrel shown in figure 7 appears to be the most satisfactory package now in general use for potatoes. If properly made, it is sufficiently strong to carry the weight of its contents and fully protect the potatoes.

Investigation shows that there is much less breakage in cars where the barrels are loaded on end than when loaded on the bilge. When loading on end, place five barrels across the end of the car. These



FIG. 7.—Double-headed ventilated barrels loaded on end. Strips should have been placed between the layers in this load.

will practically fill the width of the car, and there will be 105 barrels on each layer of a 36-foot car. Lay strips of wood on top of these barrels and place the second layer of barrels directly on top of the first row. Continue this method throughout the car, taking great care to keep the barrels tight against one another.

There is one serious objection to loading barrels on end. In some cases, owing to jolting in transit, they appear to be of slack measure when they arrive at the market. This fault can be largely eliminated, however, if growers will fill their barrels well, shaking them down repeatedly while filling, and using a press when heading.

Boards 1 by 6 inches or slab wood not less than  $1\frac{1}{2}$  inches thick at the center should be nailed to the door posts inside each doorway, to prevent the barrels from bulging the doors or falling out of the



FIG. 8.—Barrels loaded on their bilge crosswise of the car. Note that the barrels on the fourth layer should have been against the wall on the right.

doorway. In odd-sized cars it may be necessary to load the barrels in the doorway on their bilge in order to make a tight load. Loading barrels on their bilge is not a safe practice unless "headliners" (strips to prevent the heads from bulging) are used. Records show that practically every car loaded on the bilge without headliners has from three to thirty or more barrels crushed and broken on arrival at the



FIG. 9.—Barrels loaded on their bilge lengthwise of the car. If barrels are loaded on their bilge "headliners" should be used.

markets. This breakage has proved to be as bad in lightly loaded as in heavily loaded cars.

#### CLOTH-TOPPED BARRELS.

The cloth-topped barrel carries best when loaded on end as described for double-headed barrels, but when the second layer is placed on top there is, of course, a good deal of bruising of the top potatoes of the lower barrels.

When the cloth-topped barrel is loaded on its bilge, the weight of the load is thrown upon the potatoes themselves, resulting in considerable crushing and bruising. The top layer of barrels, however,



FIG. 10.—What happens when barrels are loaded on their bilge. Characteristic breakage in a car of double-headed barrels. The heads give way and the barrels collapse from the weight above, causing bruising and mashing of the potatoes.

may safely be loaded on bilge. When this is done, the cloth top should face the inside of the car, particularly in the doorway. This lessens danger of injury by the sun and loss by pilfering.

#### SLAT OR VENEER BARRELS.

Slat or veneer barrels are too flimsy for potatoes. They crush and break easily and should not be used for heavy produce.

#### SACKS.

The sack is not as suitable a container for tender new potatoes as the barrel. It offers less protection from bruising and makes a load that is difficult to ventilate, but has the advantage of being lower in cost than barrels or crates.

When sacks are used it is best to use only new ones. Second-hand sacks present a very unattractive appearance on the market and the original contents may also have a detrimental effect on the quality and condition of the potatoes shipped. A few shippers have used paper fiber sacks in place of burlap sacks with good success.

Sacks should be of no greater capacity than 120 pounds, since such a sack can be handled with much greater care than a larger sack and lends itself better to adequate ventilation of the shipment. Loading sacks in any car without provision for ventilation throughout the load is inviting loss. Loads similar to that shown in figure 11 are rather common in certain sections and are the causes of heavy losses of new potatoes.



FIG. 11.—It is impossible to ventilate a load like this. Car loaded in such a way that no ventilation can reach the center of the load. This car was badly overheated when it arrived at destination. Louisville, Ky., June 8, 1918.

#### 150-POUND SACKS.

One hundred and fifty pound sacks are not desirable, but as they are used frequently the following method of loading them, illustrated by figure 12, is recommended. Place the first sack on end in one corner of the car with the flat side of the sack leaning against the side of the car. Make sure that the bottom of the sack is at least 6 inches from the side of the car. Lean two more sacks against the first. (The bottom of the last sack should come nearly to the center line of the car.) On top of these three sacks place one sack flat, taking care to keep one end *at least 10 inches* from the side of the car, and the other end well on top of the upright sack nearest the center line. Another sack should be placed flat on top of this, but

with one end *tight* against the side of the car. The manner in which these two flat sacks are loaded is very important, for if they are not correctly and securely placed, the load is practically certain to shift in transit.

Exactly the same method is followed on the opposite side of the car. This will give a load of 10 sacks to the stack across the car with an open V-space in the center for ventilation. By following this plan, nine stacks can be placed in each end of a 36-foot car from the end wall to the doorframe. When the doorway is reached, three strips 6 inches wide should be nailed across the opening, the sacks being loaded against these strips in the same manner as in the ends of the car. The important points are to prevent the sacks from jamming the doors and to avoid their blocking the aisle, thereby cutting off ventilation. It is impossible to obtain this result by any of the other methods in common use.

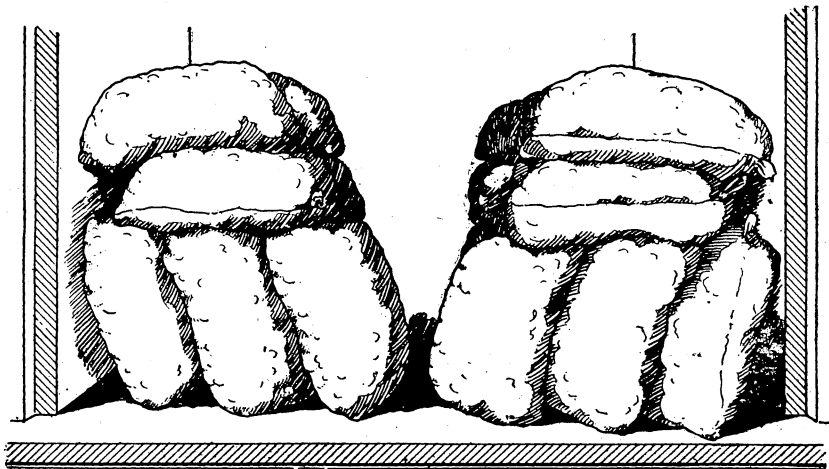


FIG. 12.—Loading 150-pound sacks. The most satisfactory method of loading 150-pound sacks.

#### 90 TO 120 POUND SACKS.

Sacks ranging from 90 to 120 pounds are loaded in the same manner as the 150-pound size, except that both the layers of sacks which are laid flat extend entirely across the three upright sacks beneath and touch the side wall of the car. (See fig. 13.) When small sacks are used, it may be necessary to modify slightly the above load to get a minimum carload. The most satisfactory method to accomplish this is to use one more upright sack in each stack, as illustrated in figure 14. It should be cautioned again that placing sacks in the V-shaped opening left for ventilation from end to end of the car retards air passage to such an extent that overheating results.

In some sections of the South it is the usual practice to load cars of sacked potatoes in two rows of five layers placed flat along each



FIG. 13.—Loading 90 to 120 pound sacks. This car is well loaded Don Tol, Tex., May 22, 1918.

side of the car, as shown in figure 15. Market inspections have shown clearly that this type of load is extremely unsatisfactory. In the first place it causes considerable bruising; secondly, overheating results from the poor ventilation between the sacks; and, thirdly, the load seldom remains in place during transit, but usually shifts as shown in figure 16, causing further bruising and overheating.



FIG. 14.—A variation of the standard load. Loading 100-pound sacks so as to secure a heavy-weight shipment with the greatest amount of ventilation. Lafourche, La., June 1, 1918.

**HAMPERS.**

Hampers are not suitable packages for potatoes. They do not have the necessary strength for the weight of their contents and afford little protection. As long as hampers are used for potatoes and other heavy produce, severe losses from breakage in transit will ensue.

If hampers for any reason must be used, they should be loaded on end with alternate baskets inverted. Great care should be taken



FIG. 15.—This load will not carry safely. Loading sacked potatoes 1 row with 5 layers of sacks placed flat along each side of the car. Hastings, Fla., April, 1918.

to make the load tight, with no slack space either endwise or across the car. This precaution will lessen but not entirely prevent shifting.

The practice of loading hampers on their sides can not be too severely condemned. Complete and careful inspections show that in cars loaded in this manner an average of fully 60 per cent of the hampers are more or less crushed and broken on arrival at market, with consequent severe damage to their contents. (See cover illustration.)



**CRATES.**

Crates of various sorts are being used for new potatoes and are satisfactory when of sufficient strength. Weak or poorly constructed crates should not be used under any circumstances. Crates with large spaces between the slats tend to allow the potatoes to shrivel while in transit, and are objectionable for this reason. At present, the chief objection to the crate is that the market cities are not accustomed to this style of package, and the potatoes consequently are likely to sell for less than those put up in other containers. However, they make a very attractive-appearing car when properly loaded, and this prejudice should disappear.



FIG. 16.—Shifting like this damages the potatoes. Appearance of car loaded as shown in figure 15 on arrival. Chicago, Ill., May 8, 1918.

In loading crates care should be taken to make the load tight and firm, especially from end to end of the car. No slack space should be left under any circumstances without suitable bracing. The crates should be held in place with car strips.

**TYPES OF CARS.**

Good types of ventilated box cars and stock cars are suitable for shipping new potatoes when loaded correctly. When the potatoes are sound and of good quality 30,000 pounds is a safe load.

Double-decked stock cars are used in some sections and can be safely loaded by placing one solid layer standing upright on each deck. The sacks should not be loaded too tightly against one another.

Stock cars have the objection that sacks are occasionally cut open and potatoes stolen through the slats while en route. There is also some danger of damage by rain, sunburn, and especially shriveling. As a protection from the weather, the open parts of stock cars should be lined with strong building paper.

California summer shipments, as well as those from other western territories, have been made "under ice" in refrigerator cars during the last few years. The shippers are almost unanimous in stating that the additional cost of icing is much more than repaid by the improved condition of the potatoes on arrival. When the practice was first started there was considerable objection by the receivers, who



FIG. 17.—Do your potatoes arrive at market like this? Sack of potatoes at destination showing soft and worthless potatoes throughout sack. Every sack in this car had to be resorted, and over 4,000 pounds of potatoes were thrown away. The sound potatoes were in such condition that they could be sold only to the cheapest trade. Cincinnati, Ohio, June 12, 1918.

thought the stock would go down rapidly on withdrawal from the cars. Stockton shippers state that this objection proved to be unfounded and that they now refuse to ship new potatoes without ice in most cases unless the receiver takes all risk. This method should receive a fair trial in other sections.

#### ADDITIONAL POINTS TO BE REMEMBERED.

1. A Service and Regulatory Announcement issued by the U. S. Bureau of Chemistry November 12, 1917,<sup>1</sup> states that "potatoes in barrels, crates, and hampers, and in sacks of uniform quantity of

<sup>1</sup> U. S. Department of Agriculture, Bureau of Chemistry. Service and Regulatory Announcement No. 21, 1917.

contents" under the net-weight amendment to the food and drugs act, should "be marked by weight or dry measure, or when packed in barrels, in terms of the United States standard barrel and its lawful subdivisions, i. e., third, half, or three-quarters."

2. It is required by law <sup>1</sup> that the barrels used for the shipment of potatoes shall have the following dimensions:

Legal dimensions for potato barrels.

	Inches.
Length of stave.....	28½
Diameter of heads.....	17⅞
Distance between heads.....	26
Circumference of bilge, outside measurements.....	64
Thickness of staves not greater than.....	$\frac{1}{16}$

"Provided that any barrel of a different form having a capacity of seven thousand and fifty-six cubic inches shall be a standard barrel."

3. The terms used by the Bureau of Markets in describing methods of loading cars are defined as follows:

**Layer:** A course or stratum of the load in a car, one package in height, shall be known as a layer.

**Stack:** A pile of packages extending from one side of the car to the other, one package in length, shall be known as a stack.

**Row:** A pile of packages extending lengthwise of the car, one package in width, shall be known as a row.

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<sup>1</sup> Public No. 307, 63d Congress, approved Mar. 4, 1915.



#### CAR-LOADING PUBLICATIONS OF THE U. S. BUREAU OF MARKETS.

Factors in Transportation of Strawberries from the Ozark Region. Markets Doc. 8.

Loading and Transporting Western Cantaloupes. Markets Doc. 10.

Heavy Loading of Freight Cars in the Transportation of Northwestern Apples. Markets Doc. 13.

Loading American Grapes. Markets Doc. 14.

Lining and Loading Cars of Potatoes for Protection from Cold. Markets Doc. 17.

Handling and Loading Southern New Potatoes. Farmers' Bulletin 1050.

Copies of these publications may be had as long as the available supply lasts upon application to the Division of Publications, United States Department of Agriculture, Washington, D. C.